Figure 12.1 Campsite Condition and Distribution

Value to be Maintained and Enhanced	Indicators	Standards	Management Action(s) to be Implemented	Monitoring and Sampling Procedures
Campsite Condition and Distribution	Barren core area within each site Tree and perimeter vegetation damage Soil compaction Number of access trails at campsite Fire impacts Trail erosion adjacent to site Disturbance of archeological features Number of campsites	**THRESHOLD OPPORTUNITY CLASS** **Designated sites:** Condition Class: 5% or less in CC5 85% or less in CC5 or 4 **At-Large camping:** Condition Class: 5% or less in CC5 25% or less in CC5 or 4 50% or less in CC5,4, or 3 85% or less in CC5,4,3 or 2 Total Barren Core Area: Maximum of 2000 ft^2 in designated or at-large sites. **PRIMITIVE OPPORTUNITY CLASS** Condition Class: 0% in CC5 5% or less in CC4 20% or less in CC4 or 3 50% or less in CC4,3 or 2 Total Barren Core: Maximum of 1000 ft^2 per square mile. **WILD OPPORTUNITY CLASS** Condition Class: 0% in CC5,4 or 3 25% or less in CC2 Total Barren Core Area: Maximum of 500 ft^2 per square mile.	Routine patrols for resource protection. Low-impact wilderness use education. Minor rehabilitation and obliteration of illegal sites in designated site use areas. Action plans for major work projects for trail and campsite rehabilitation. Designation of additional camping sites or areas. Decrease use limits. Closure of campsite on temporary or permanent basis. Mitigation to recreational impacts along beaches and at river-use attraction sites (Little Colorado River, Elves Chasm, Thunder River, Deer Creek, etc.) outlined in the Colorado River Management Plan.	Permit system: data provided for assessing actual use vs levels of impact. Rapid Campsite Assessment: 5 to 10 Use Areas per year. Baseline inventories for all use areas, subsequent monitoring based on Opportunity Class, use levels, patrol schedules, and mitigation priorities. Intensive Campsite Assessment conducted when additional campsite data is needed, such as when major changes in Use Area status or boundaries is proposed. Study of 24 sites in 3 vegetation types conducted on five year cycle. (Cole, 1985)

Figure 12.2 Visitor Experience

Value to be Maintained and Enhanced	Indicators	Standards	Management Action(s) to be Implemented	Monitoring Programs and Sampling Procedures
Visitor Experience	Number of backcountry visitors: actual density Campsite Density Perceived Crowding Number of groups camped w/in sight or sound Number of parties contacted while travelling Number of encounters between different types of users Litter Number of occurrences of human noises per hour or day (e.g. aircraft, motors)	**CORRIDOR OPPORTUNITY CLASS** Developed, designated sites in main cluster. High probability of contacts w/ up to 30 parties in camps and large numbers on corridor trails. High probability of contacts with mules (concession and NPS) on Bright Angel, S.Kaibab and N.Kaibab trails. Frequent use of helicopter for administrative purposes. No tour operator flights in Bright Angel Flight Free Zone. **THRESHOLD OPPORTUNITY CLASS** Campsite density limited by designated sites. Max. 20 campsites in any square mile area in at-large camping use areas. 80% probability of camp contacts with up to 5 parties per night. 80% probability of up to 10 contacts with other overnight parties per day except in Monument and Hermit where up to 15 contacts may occur. Low probability of contacts with stock, except for NPS maintenance.	Routine compilation of Backcountry and Rim Use Areas use statistics. Routine patrols and maintenance. Visitor contacts. Interpretive programs. Education on low-impact camping techniques. Obliteration of illegal sites in designated camp areas. Obliteration of selected sites in use areas where density exceeds standards. Dispersal of use in clustered designated site use areas, by trail and campsite relocation or rehabilitation. Pre-trip information on aircraft use and zoning for trip planning purposes. Pre-trip information on river runners use of popular camping beaches along the Colorado River.	Campsite density (number per square mile area) data collected in Rapid Campsite Assessment (RCA) monitoring program. See Appendix J. Backcountry user survey for camp and trail encounters. Use of diary, or survey form based on programs developed by Underhill and Stewart et.al., (1986). Correlate number of encounters with satisfaction levels in non-corridor use areas. Surveys approved by OMB. Aircraft monitoring program: Observation and recordation of number and type of flights over Flight Corridors. Correlation of visitor satisfaction with levels of aircraft noise.

Figure 12.2 Visitor Experience (Continued)

Value to be Maintained and Enhanced	Indicators	Standards	Management Action(s) to be Implemented	Monitoring Programs and Sampling Procedures
Visitor Experience	Number of backcountry visitors: actual density Campsite Density Perceived Crowding Number of groups camped w/in sight or sound Number of parties contacted while travelling Number of encounters between different types of users Litter Number of occurrences of human noises per hour or day (e.g. aircraft, motors)	**PRIMITIVE OPPORTUNITY CLASS** Maximum of 10 campsites in any square mile area per Use Area. 80% probability of camp contacts with up to 2 parties per night except in rim areas and Tanner where more may occur. 80% probability of up to 5 contacts with other overnight parties per day except in rim areas and Tanner, and along Colorado River where more may occur. Low probability of contacts with stock, except for NPS maintenance. **WILD OPPORTUNITY CLASS** Maximum of 5 campsites in any square mile area per Use Area. No contacts with other overnight parties. 80% probability of contacts with one overnight party per day. Probably no contact with day hikers. No probability of contacts with stock. **ALL AREAS:** High probability of occurrences with aircraft noise in use areas beneath designated flight corridors. High probability of occurrences of noise from motors in areas adjacent to the Colorado River during the Primary Use Period (5/1-9/15).	Education on low-impact camping techniques. Obliteration of illegal sites in designated camp areas. Obliteration of selected sites in use areas where density exceeds standards. Dispersal of use in clustered designated site use areas, by trail and campsite relocation or rehabilitation. Pre-trip information on aircraft use and zoning for trip planning purposes. Pre-trip information on river runner use of popular camping beaches along the Colorado River.	Campsite density (number per square mile area) data collected in RCA monitoring program. See Appendix J. Backcountry user survey for camp and trail encounters. Use of diary, or survey form based on programs developed by Underhill and Stewart et.al., (1986). Correlate number of encounters with satisfaction levels in non-corridor use areas. Surveys approved by OMB. Aircraft monitoring program: Observation and recordation of number and type of flights over Flight Corridors. Correlation of visitor satisfaction with levels of aircraft noise.

Figure 12.3 Cultural Resources

Value to be Maintained and Enhanced	Indicators	Standards	Management Action(s) to be Implemented	Monitoring and Sampling Procedures
Cultural Resources	Site Integrity Vandalism (potholes, graffiti) Site Alterations (fallen or stacked rock elements) Collector's Piles Loss of Artifacts Trailing Soil Compaction Vegetation Trampling	No significant cultural resource which is being damaged by human use or eroded by natural forces--to the point there is a danger of loosing integrity or informational values--will be acceptable.	Public information and education through written materials, and visitor contacts. Impose site specific regulations and special use limitations in compliance with National Historic Preservation Act and NPS policies. Recreational use may be restricted to areas outside designated historic districts, traditional cultural places, and other areas where cultural resources are threatened by visitation. Restoration and rehabilitation of disturbed sites will be conducted and may include stabilization, trail re-routing, etc. Areas where cultural sites are threatened as a result of recreational use will be closed. Sites will be excavated, data analyzed, and crated.	Archeological surveys of main wilderness trails, designated camp areas, and popular at-large sites in all use areas. Cyclic site monitoring conducted in conjunction with campsite monitoring and trail surveys.

Figure 12.4 Water Resources

Value to be Maintained and Enhanced	Indicators	Standards	Management Action(s) to be Implemented	Monitoring and Sampling Procedures
Water Quality	Fecal coliform Temperature Dissolved Oxygen Turbidity	State and Federal standards for chemical and biological parameters. Maintain natural water quality to promote healthy habitat.	Health Advisories. Alteration of camping facilities. Use area limits may be modified based on potential hazards or impacts to water sources.	Periodic sampling of water quality parameters to: 1) develop baseline data, 2) characterize natural conditions, 3) identify impact of management actions and visitor use.
Water Quantity	Instream flow levels Vegetation type Vegetation condition Presence of wildlife	Maintain natural flow regimes of springs, seeps, and tributaries of the Colorado River.	Water chemistry studies. Inventory all tributaries and quantify flows to greatest extent possible. Conduct Wild & Scenic Rivers suitability studies for major tributary streams.	Periodic sampling of water chemistry and routine discharge measurements. Inventory & monitor riparian vegetation extent and composition to document changes.

Figure 12.5 Trail Condition

Value to be Maintained and Enhanced	Indicators	Standards	Management Action(s) to be Implemented	Monitoring and Sampling Procedures
Trail Condition	Number of permitees Number of day users Stock Use (commercial, noncommercial and administrative) Erosion Number of multiple trails (incl. switchback cuts)	**CORRIDOR TRAILS** Type A, Level I. Maintained for high use. The N. Kaibab, S. Kaibab, Bright Angel, Plateau Point, Colorado River, and Arizona trails are designated Corridor Trails. **THRESHOLD TRAILS** Generally, Type C, Level IV. Maintained for semi-primitive, medium to low use levels. Special management actions apply to trails listed on National Register. Threshold trails include the Hermit, Clear Creek N.Kaibab to Clear Creek drainage, Thunder River, and Grandview trails. **PRIMITIVE TRAILS** Type C, Level V. Maintained for primitive, low use levels. Historic features are generally absent. Primitive trails include the Havasu, Tonto, S.Bass, Boucher, Hance, Tanner, Beamer, Nankoweap, N.Bass, S.Canyon, Deer Creek, Kanab Creek, Tuckup, Lava Falls, and river attraction site trails. **WILD TRAILS/ROUTES** Type C, Level V. Maintained for primitive, low use levels. No evident historical trail construction, user-defined paths in more remote areas.	On-going, routine maintenance of heavily used Corridor trails. Development of Action Plans for maintenance and rehabilitation of Threshold and Primitive trails. Trail maintenance performed to protect integrity of historical features, maintain maximum trail width and outslope. Development of Action Plans for rehabilitation work on Routes to mitigate unacceptable resource damage only. Trail rehabilitation on Routes performed not to exceed standards for Primitive Trails. Trail closure as necessitated by extensive damage to natural and cultural resources, or for human safety.	Trail condition surveys conducted on Threshold and Primitive trails on cyclic basis. Monitoring of river attraction site trails and some Threshold and Primitive trails that lead to camps adjacent to the Colorado River, conducted annually in the fall following primary river use period.

Figure 12.6 Wilderness-related decision matrix for scientific permit applications

Each column of this table represents one set of ranking criteria (e.g., significance, safety, effects on park resources, etc.). Proposals that match descriptions at the top of a column are frequently complex and controversial. Some will require lengthy impact assessments and negotiation prior to a permit decision. Decision making is simpler for proposals matching descriptions near the bottom of a column.

Means of Access[1]	Mechanized Equipment[2]	Magnitude of Effects	Duration of Effects
Helicopter Fixed-wing aircraft Off-road motorized vehicle (e.g., truck, auto, ATV, snowmobile) Sport or utility watercraft (i.e., frequent upriver travel) Motorized watercraft (i.e., principally downriver travel) Nonmotorized wheeled vehicles (e.g., bike, wagon) Oar-powered watercraft (e.g., raft, dory, kayak) Stock animals Human powered (e.g., day hike, backpack, x-country ski, sled, climb)	Combustion engines (e.g., generators, pumps, motors) Solar, battery, wind, current, and hand-powered devices No powered devices	Potential regional or greater effect (e.g., species introductions) Potential effects extend over a broad area within or adjacent to the Park unit (e.g., fire, river manipulation, extensive aircraft use) Potential effects confined to multiple small areas (e.g., multiple small sampling plots, excavations, campsites) Probable effects confined to a single study site, which will be restored and is out of public view. Probable effects will be hard to detect without prior knowledge (e.g., limited sampling of loose geologic materials, seasonal plant growth, water, or air) No physical site impacts anticipated (e.g., photography, survey, sound or climate monitoring)	Permanent modification of park resources or adjacent areas (e.g., construction of a permanent study platform, field laboratory, or quarters; alteration of non-renewable resources, excavation of archaeological or paleontological sites) Long-term impacts (6 months to several years) to renewable resources (e.g., tree damage, population manipulation, excavations in recent sediments above mean high water) Seasonal impact (2 - 6 months, e.g., removal of seasonal plant growth, disturbance of beach deposits) Extended impact (obvious to casual observers for 2-4 weeks) Short term impact (1 day to 2 weeks, e.g., surface water dye studies, overnight field excursion) Instantaneous disturbance (e.g., seismic survey blast) No apparent impact
[1] Use restrictions apply to all forms of access except day hikes and public roads.	[2] Use of quietest available technology may be required.		

Frequency of Disturbance	Field Crew	Safety	Cost/Benefit Factors
Continuous or near continuous activity (e.g., permanent field laboratory) Frequent, long term activities (seasonal encampments) Multiple overnight site visits Multiple daytime site visits (e.g., repetitive surveys, data collection) Single overnight site visit Single daytime site visit No site visit (e.g., high altitude remote sensing)	Multiple group encampments or very large groups (e.g. 12 or more persons) Large group encampment (e.g., 7-11 persons) Small group encampment (2-6 individuals) Single individual No additional personnel placed on site, activities concurrent with approved site visits for other studies No site visit	High perceived risk to project personnel, visitors, or park staff from proposed activities. Training, safety gear, and other reasonable precautions do not appear sufficient to mitigate risk. Participation of essential personnel will not be possible under existing safety or logistical stipulations. Other qualified personnel are not available (i.e., can't complete primary study objectives given current restrictions). Participation of preferred, but non-essential personnel may be limited by safety or logistical considerations, inaccessibility of site, or personal capabilities (e.g., technical rock climbing, hike out from river). Other qualified individuals can be available to complete tasks. Broad participation of study team may be possible, but will require development of additional skills, special training or certification, guide services, special supplies or equipment (e.g., backpack, river trip, winter camping, electrofishing). Participation of study team is not limited by safety, logistical considerations or permit stipulations. Risks or other limitations associated with proposed activities can be significantly reduced by alternate methods acceptable to all cooperators.	Cost of NPS requirements associated with the proposed activities will make completion of the primary study objective infeasible. Permit stipulations are expected to increase cost to the point that meeting the secondary objectives will not be achieved. Permit stipulations will increase costs to the point that other, equally important, studies will be negatively affected. Permit stipulations have no lasting significant effect on ability to complete the study, or on institutional capabilities. Proposed alternatives are expected to reduce total project costs

Scheduling	Significance/Urgency		
Timing of access is critical, and may be spur-of-the-moment. Essential data can only be collected within a short window of time. (e.g., studies of short term or unpredictable phenomena, floods, migrations, fire, seismic activity). Study has specific seasonality and site visits must be made during pre-established time frames (e.g., migratory wildlife, plant or animal reproduction, seasonal growth, seasonal visitation). Study objectives can be met at any time of year subject to convenient scheduling of personnel, equipment, access, funding, etc. (i.e., work is not seasonal, resources are relatively stable, e.g., geologic strata, archaeology, paleontology, forest history) Study objectives have a high probability of being met through opportunistic sampling (e.g. river guide monitoring of beach sites, participation on river trips on a space-available basis)	Proposed activity is deemed inappropriate for NPS areas (permit will be denied) Importance of study, or the need for conducting the study within an NPS area, is not supported by the proposal (permitting decision will be postponed pending major proposal revision) Significance of study and need for conducting activities in protected NPS areas is documented in letters of recommendation from the investigator's institution and colleagues, but is not supported by qualified independent peer reviews (permitting decision may depend on a compelling justification by principal investigator or other recognized authority if there is any potential for resource impacts or interference with visitors) Significance of study and value to the park unit is clearly recognized by qualified independent peer reviews and by park management Broad recognition for the importance of the study exists at park, regional, and national/international level. Data are deemed important to solving immediate threats to public resources or human safety Need for studies on this topic is documented in the Park's current Resource Management Plan		